

WHAT IS CLAIMED IS:

1. A four-wheel drive apparatus for a vehicle, comprising:
an engine for driving a front wheel shaft of the vehicle;
a generator connected to the engine for generating electric current;
5 a motor driven by the electric current supplied from the generator; and
a clutch interposed between the motor and a rear wheel shaft for transferring a driving
force thereto.
2. The four-wheel drive apparatus of claim 1, further comprising:
10 a first speed sensor for detecting RPM of the front wheel shaft;
a second speed sensor for detecting RPM of the rear wheel shaft; and
a controller,
wherein the controller controls the motor based on a difference between the RPM of
the front wheel shaft and that of the rear wheel shaft.
- 15 3. The four-wheel drive apparatus of claim 2, further comprising:
a third speed sensor for detecting RPM of the motor,
wherein the controller controls the clutch based on a difference between the RPM of
the rear wheel shaft and that of the motor.
- 20 4. The four-wheel drive apparatus of claim 3, wherein the motor is controlled in a PWM
manner.

5. A four-wheel drive method for driving a rear wheel shaft in addition to a front wheel shaft, comprising:

determining if four-wheel drive is required;

5 generating electric current utilizing a generator connected to an engine;

driving a motor with electric current supplied from the generator; and

driving the rear wheel shaft with a driving force transferred from the motor through a clutch.

10 6. The four-wheel drive method of claim 5, wherein the determining if four-wheel drive is required comprises:

detecting RPM of the front wheel shaft and the rear wheel shaft;

computing a difference between the RPM of the front wheel shaft and that of the rear wheel shaft; and

15 determining if the computed difference is higher than a predetermined value,

wherein if the difference between the RPM of the front wheel shaft and that of the rear wheel shaft is higher than the predetermined value, four-wheel drive is determined to be required.

20 7. The four-wheel drive method of claim 6, wherein the generating of electric current comprises:

computing a torque of the motor required for compensating for the difference between

the RPM of the front wheel shaft and that of the rear wheel shaft; and
generating electric current based on the required torque.

8. The four-wheel drive method of claim 7, wherein the generating electric current is
5 executed in a feedback control manner.

9. The four-wheel drive method of claim 7, wherein the driving of the motor with electric
current supplied from the generator comprises:

detecting RPM of the motor;

10 applying stator current to a stator of the motor based on the RPM of the motor; and

applying rotor current to a rotor of the motor with the generated electric current from
the generator.

10. The four-wheel drive method of claim 9, wherein the driving of the rear wheel shaft
15 with a driving force transferred from the motor comprises:

determining if the RPM of the motor matches the RPM of the rear wheel shaft;

connecting the motor to the rear wheel shaft through the clutch if the RPM of the
motor matches the RPM of the rear wheel shaft; and

accelerating the motor if the RPM of the motor does not yet match the RPM of the

20 rear wheel shaft .